

Testosterone

Hormone therapy can help transgender people feel more comfortable in their bodies, changing their bodies to align more with their gender identity. Like with other medical treatments, there are risks and benefits. This information is to help patients and families understand the medical care available to work with their treatment team to make the best decisions for what is right for them.

What is a hormone?

Hormones are chemical messengers that are made in one organ (a gland) and have an effect somewhere else. There are many different glands in the body (thyroid, pituitary, adrenal, testicles, pancreas and others) that produce many different hormones (thyroid, LH, FSH, growth hormone, cortisol, testosterone, insulin and others) that have a wide range of effects on the human body. Hormones are responsible for growth, puberty, overall metabolism, blood sugar regulation, hunger, thirst among other body functions. A hormone must bind to a receptor on a cell in order for specific actions to occur. All hormones are highly regulated by the body.

What about sex hormones?

Sex hormones regulate the development of puberty and the changes that result from it. They are mainly produced by the sex organ (ovary or testicle), although some are made in the adrenal gland. These hormones produce the changes associated with puberty such as facial and body hair, breast growth, bone strength, among others.

There are 3 categories of sex hormones:

1. Androgens: testosterone (produced in testicle), dihydrotestosterone (DHT, active form of testosterone, testosterone is converted to this near the organs it effects by an enzyme); other androgens that are produced in the adrenal gland
2. Estrogens: estradiol (produced in ovary)
3. Progestin: progesterone (produced in ovary)

What is Gender Affirming Hormone Therapy or Testosterone Therapy?

Gender affirming hormone therapy refers to taking medicine to change the level of sex hormones in the body. Changing these levels will affect features that are associated with sex and gender. Masculinizing hormone therapy can help make the body look and feel less feminine and more masculine.

What Medicines (hormones) are Involved?

Testosterone is the main hormone responsible for promoting masculine physical traits. It works directly on tissues in the body and will eventually suppress estrogen production by the ovaries. Most commonly, testosterone is given by an injection under the skin (subcutaneously). It can also be administered by intramuscular (in the muscle) injections. Testosterone in patch or gel are available for adults, but do not come in doses accurate enough for pediatric patients.

Medicines to Stop Menses/Periods/Cycles

Eventually menses will stop once levels of testosterone are high enough to suppress estrogen production. There are options to stop cycles sooner. Typically, progestin only methods of birth control such as Depot Provera (an injection 1x every 3 months), or an Intra Uterine Device (placed by an OB/GYN once every 3 -5 years) or daily birth control pills can be used. Testosterone is not birth control and it is possible to become pregnant while taking it. The above methods to stop cycles also serve to protect against pregnancy. They do not protect against Sexually Transmitted Infections.

What is a typical dose?

Gender affirming hormone therapy doses differ from person to person as bodies respond to them differently. Often this is because of the genetics each person inherits from their biological families. Providers prescribe what best fits based on individual medical history and desired outcomes. The Gender Care Center treatment team will also work with each individual/family based on insurance coverage around the best path forward.

Everyone's journey is different. Each body absorbs, processes and responds to hormones differently. Some people show more changes than others on a similar dose. Changes may happen more quickly in some compared to others and there is no way to predict how someone's body will respond before starting treatment. Taking more hormone than the prescribed dose will not

speed up the process. It can actually slow down changes as excess testosterone in the body can be converted to estrogen and increase health risks as well. We encourage each patient and family to bring up any concerns around dosage with their medical provider.

Some people, as part of their transition, have a hysterectomy (removal of uterus and sometimes an ovary/their ovaries). For those individuals, pubertal suppression (for those on it) is no longer needed.

People born with ovaries will not be able to produce the amount of testosterone needed to see the masculinizing effects of testosterone, so for those who desire the masculinizing impacts of testosterone, they will need to take testosterone for the rest of their life. This is also important for bone health.

Changes and Timeline:

Changes to Expect

Masculinizing hormone therapy can have important physical and psychological benefits in those that identify as male or non-binary. The physical and psychological benefits can vary for everyone.

It is important to remember that each person responds differently. How quickly changes appear depend on:

- Age
- The number of hormone receptors in the body (often determined by genetics)
- Body sensitivity to hormones (also determined by genetics)

Average Timeline	Effect
After 1 to 3 months	<ul style="list-style-type: none"> • Increased sex drive • Vaginal dryness • Bottom Growth • Increased growth, coarseness and thickness of body hair • Increased muscle mass and upper body strength

	<ul style="list-style-type: none"> • Redistribution of body fat (more around waist and less around hips)
After 1-6 months	<ul style="list-style-type: none"> • Cycles stop
After 3-6 months	<ul style="list-style-type: none"> • Voice cracks, starts to drop (can take up to a year)
Gradual Changes (at least 1 yr or more)	<ul style="list-style-type: none"> • Growth of facial hair • Possible male pattern balding

What Changes are Permanent or not?

Things that are permanent:

- Deeper voice
- Hair growth
- Bottom (clitoral) growth
- Male pattern baldness may not happen (depends on family history)

May or may not reverse:

- Body facial hair may decrease but usually does not completely disappear
- The ability to get pregnant

Reversible:

- Monthly cycles
- Fat muscle and acne/skin changes
- Irritability

Things that will not change with testosterone:

- Height: Once someone is done growing, there is no way to change height with hormones.
- Speech patterns: Testosterone will typically make the voice pitch drop to deeper levels. It does not change intonation or any other speech patterns.
- Body image: often taking hormones significantly improves gender dysphoria as one's body becomes more in line with their gender identity. For those that do not experience improvement in managing dysphoria with hormones, it may be beneficial to speak to a counselor or other source of support around this.

- **Mental Health:** as stated above, taking hormones often will improve gender dysphoria as one's body becomes more in line with their gender identity. Life can still present with emotional and social challenges, stress and other factors that can contribute to mental health struggles. We recommend having an established mental health provider through the transition process for ongoing support. Other supports, like groups, community, and peers to rely on can be helpful.
- **Breast Tissue:** Testosterone may slightly change the shape of the chest by increasing muscle and decreasing fat.
- **Bone Structure:** Once bones have stopped growing after puberty, testosterone can not change the size or shape of the bones. It will not increase the height or change the size of the hands and feet.
- **Fertility:**
 - Transgender males can get pregnant when on testosterone. Even if periods are suppressed on testosterone, it is recommended that some form of birth control is used for those having sex with someone who can produce sperm. Testosterone is not safe for an unborn fetus, so should be stopped if a pregnancy occurs.
 - Long term exposure of the ovaries to testosterone is not fully understood. The ability to become pregnant may not return after stopping hormone therapy. Recent studies show encouraging prospects for fertility for transgender individuals on testosterone therapy.

What are the risks of taking masculinizing hormones?

As treating transgender youth is such a new practice, long-term effects of using testosterone are not known. Knowledge of using testosterone comes from use in older transgender patients, as well as in individuals with different medical conditions requiring hormone therapy. Transgender medicine is an ongoing field of study and more will be known the longer it is practiced. There may be long term health risks we simply do not know about yet.

We try to create the safest hormone regimen for our patients by measuring levels and watching for the side effects we know about.

- Heart disease, stroke and diabetes
 - Testosterone can increase these risks as it tends to:
 - Decrease good cholesterol (HDL) and may increase bad cholesterol (LDL)
 - Increase fat deposits around internal organs and in upper abdomen
 - Increase in blood pressure
 - Decrease the body's sensitivity to insulin
 - Cause weight gain, though most of the weight gain is from muscle



- Increase the amount of red blood cells and hemoglobin (a red protein responsible for the transporting oxygen in the blood) in the body
 - The increase in the amount of red blood cells and hemoglobin is usually only to an average cisgender male range (which does not pose health risks). Occasionally, a higher increase can happen. If this does, it may cause serious problems such as stroke or heart attack. Levels will be checked regularly for those on testosterone.
- These cardiovascular risks of taking testosterone are the same as a first degree cisgender male relative.
- These risks are greater for people who smoke, are overweight, or have family history of heart disease. The risk of heart disease, stroke, and diabetes can be reduced by taking testosterone as prescribed, monitoring levels periodically, not smoking, and leading a healthy active lifestyle.
- Headaches and Migraines
 - Some people will get headaches and migraines after starting testosterone. For people with frequent headaches or pain that is unusually severe, we encourage them to talk to their primary healthcare provider.
- Cancer
 - It is not known if testosterone increases the risk of breast, ovarian or uterine cancers. These types of cancers are all sensitive to estrogen. There is evidence that some testosterone is converted to estrogen, however, compared to assigned females at birth, this level is significantly lower. Patients are at higher risk for an estrogen dependent cancer if they have a family history of these types of cancers, are 50 years of age or older, or are overweight. We encourage our patient to ask about screening for cancer if they are concerned.
- Irritability
 - Sometimes people may feel irritable on testosterone. This can be a part of going through a second puberty, and will improve over time. For patients that feel like this is a problem, we ask them to talk to their Gender Care Center medical provider.

What needs to happen for patients to start gender affirming hormone care?

As per the World Professional Association for Transgender Health (WPATH) and Endocrine Society Guidelines, a mental health professional needs to write a letter of readiness prior to starting pubertal blockers or gender affirming hormone care. The mental health questionnaire (MHQ) on our website can also be used. Here is a possible sequence of events:



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1. Some patients and families work with Gender Care Center Behavioral Health Clinician, around the WPATH letter over 2-6 sessions, and some individuals work with an outside mental health provider. For those working with an outside therapist, we ask that the patient either bring this letter or MHQ to an appointment or send via MyHealth, or have the mental health provider either fax, mail (ensure you have a copy), or secure e-mail. We will need this on file before beginning gender affirming care. We will ask you to sign a release of information (ROI) so that our team is able to follow up with your outside mental health provider as needed.
2. Appointment with Medical Provider: review of goals, treatment, side effects and timelines, physical exam if indicated. Sometimes the initial medical appointment is focused on establishing care and asking questions of the provider. We don't require the WPATH letter or assessment to be complete before an initial provider appointment. We just need that before starting gender affirming treatment.
3. Labs will be obtained after first appt with Medical Provider for those ready to move forward with gender affirming medical care, a bone age x-ray may be obtained. If the provider is concerned about bones, a dexa scan for bone health may be ordered.
4. Once labs come back, and if all looks normal, our nurse will call with the treatment plan. Patients come into the office for their first testosterone injection and the provider will call in a prescription for the treatment for follow up doses at home. We have each patient and their parent/guardian/caregiver sign an informed consent form, covering topics in this handout prior to starting testosterone.
5. Patients see their provider approximately every 3-4 months in the first year, and then every 6 months. In these appointments, we will:
 - a. Ask questions about overall health
 - b. Check vital signs (pulse, blood pressure, weight, height)
 - c. Ask about physical and emotional changes after treatment has been initiated
 - d. Ask about signs and symptoms of the side effects mentioned above
 - e. Recommend timing of blood tests and dose adjustments

Resources:

Excellence for Transgender Health

www.transhealth.ucsf.edu

Testosterone Therapy : Brief List

Testosterone: given by subcutaneous (under the skin) injections

- Effects can take months or longer to be noticeable, and the rate and degree of change cannot be predicted, and may not be complete for 2-5 years

Permanent effects

- Lower voice
- Increased growth of hair
- Genital changes (clitoral growth)

Non – permanent

- Acne
- Fat redistribution
- Increased muscle mass
- Increased libido
- Menstrual periods usually stop within 6-12 months of starting testosterone
- Vaginal dryness
- Decrease estrogen levels and may possibly lead to cessation of ovulation over time
- Future fertility may be affected
- Testosterone is not birth control
- Increases risk of
 - Elevated red blood cell count
 - Liver dysfunction
 - High blood pressure / Heart disease
 - Lipid (cholesterol) changes (decrease HDL and Increase LDL)
 - Weight gain
 - Salt retention
 - Lipid (cholesterol) changes (decrease HDL and Increase LDL)
 - Makes cervix and walls of vagina more fragile
 - Headaches or migraines
 - Possible period of irritability as adjusting to dose